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van Ours, J.C.

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Union growth in The Netherlands 1961–1989

J. C. VAN OURS

Department of Economics, Free University, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands

An empirical analysis is presented of union growth in The Netherlands over the past decades. The analysis shows that the effect of changes in the industrial structure is very small. It appears that union growth is influenced by wage growth and by unemployment. If real wages increase more than labour productivity or if unemployment declines union membership increases.

I. INTRODUCTION

Unions in The Netherlands are organized by industry. Most of these unions co-operate at a national level and belong to one of the union federations FNV, CNV or MHP.[1,2] This paper is concerned with the developments in union membership at the national level. After a steady growth in the 1960s and 1970s, union membership declined substantially at the beginning of the 1980s from 1.8 million in 1980 to 1.5 million in 1985 (see Fig. 1). In recent years there has been a small recovery. The largest union federation, the FNV, had 1.05 million members in 1980, 0.90 million members in 1985 and about 1.0 million members in 1990.

Figure 2 shows the union density, defined as a share of employment. The union density remained quite stable in the 1960s and 1970s but declined substantially in the 1980s; the total union density was about 30–40% in the 1960s, increasing somewhat in the 1970s. In the 1980s the total union density declined from 43 to 33%. FNV union density was about 25% in the 1960s and 1970s and decreased at the beginning of the 1980s to 19% in 1985, to remain stable in later years.

Labour relations in The Netherlands are quite harmonious. There are hardly any big industrial conflicts, and strike activities rarely occur. Dutch unions have done much to promote central wage bargaining and usually unions and employers organizations agree on the principles of wage determination. The bargaining position of the unions may or may not be weakened by the decline in union density at the beginning of the 1980s. An important question related to this is whether or not this decline is temporary or structural. If the decline in union density is temporary then the bargaining position may not be weakened at all. However, the decline may be due to structural factors, for example, because of changes in the sectoral structure of the Dutch economy, with low-density sectors growing faster than high-density sectors. Then, consensus between union and employers organizations may crumble if union behaviour becomes more militant than before. In that case labour relations in The Netherlands will change.

To investigate the determinants of union growth in The Netherlands we perform both a decomposition analysis and a time-series analysis. The decomposition analysis disentangles the effects of changing industrial structure and the effect of changing union membership within sectors. The time-series analysis investigates the influence of other determinants.

In time-series studies of union growth the dependent variable is usually either the rate of growth of union membership or union density. The present study uses the

[1]The FNV (Federatie Nederlandse Vakbeweging) originated in 1982 from the amalgamation of the Socialist federation NVV (Nationaal Verbond van Vakverenigingen) and the Catholic federation NKV (Nederlands Katholiek Vakverbond). For the period before 1982 the sum of NVV and NKV membership is taken as the membership of the FNV. The CNV (Christelijk Nationaal Vakverbond) is a Protestant union federation. In 1975 the MHP (Vakcentrale voor Middelbaar en Hoger Personeel), a union federation especially for white-collar workers unions, was established.

[2]Data on union membership used here are from the Central Bureau of Statistics. Union density is defined as a share of employment. The data used in the time-series analysis are available on request.

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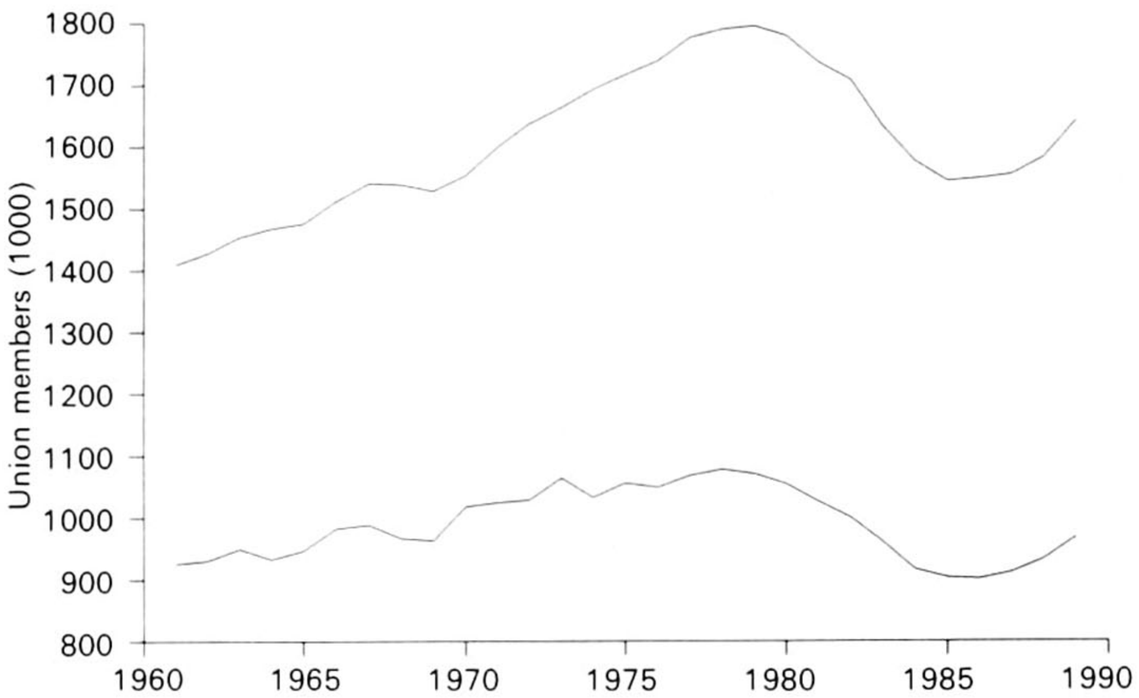

Fig. 1. *Union members in The Netherlands; total and FNV 1961–89*

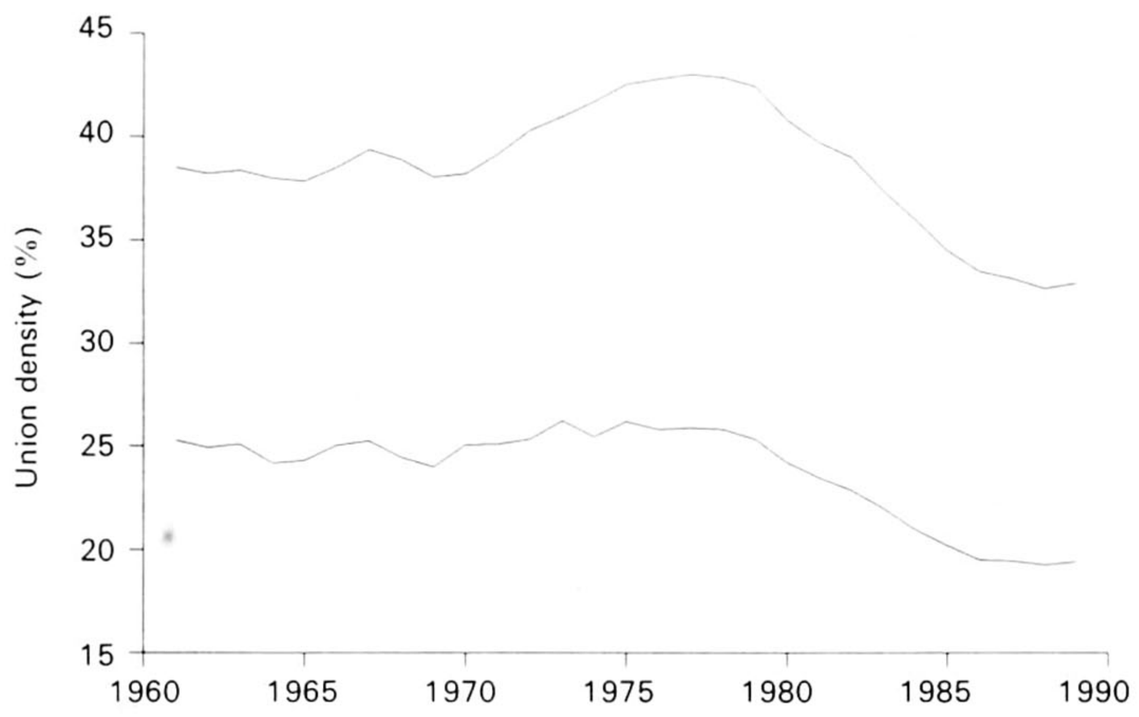

Fig. 2. *Union density in The Netherlands; total and FNV 1961–89 (percentage of employed workers)*

rate of growth of union membership as the dependent variable and uses lagged union density as one of the explanatory variables. Apart from lagged union density, the unemployment rate and labour income ratio are used as explanatory variables. An attempt is made to determine whether or not the sharp decline in union density at the beginning of the 1980s is a short-term deviation from a long-term development or a structural break.

Data on union membership are collected by the Central Bureau of Statistics (CBS) on a quarterly basis for unions belonging to the federations FNV, CNV or MHP. A CBS survey among all unions is only undertaken every two years. Total union membership data are, therefore, not available for every year: yearly data for non-survey years are constructed by averaging over two surveys. In the decomposition analysis of Section III the data from the survey held every two years are used. For the time-series analysis the annual data of FNV union membership are employed.[3]

The present paper is set up as follows. In Section II the theory of union membership and some empirical studies are briefly discussed. Section III describes developments in union membership in The Netherlands both qualitatively and quantitatively. A decomposition of union density in a sectoral and non-sectoral part is presented, from which it appears that changes in the sectoral structure only added a small contribution to the decline in union density. Furthermore, some information on the inflows to and outflows from unions is also presented. In Section IV the results of the time-series analysis of union growth are presented. Section V concludes.

II. UNION MEMBERSHIP: THEORY AND EMPIRICAL RESEARCH

From the perspective of the individual worker (Hirsch and Addison, 1986) the decision to become a union member depends in theory on the costs and benefits connected to that membership. Theory on union membership, however, is not developed to a high degree of sophistication. Membership studies usually just mention the factors involved, like the individuals' expected benefits of higher wages, greater employment security or better working conditions when joining a union. A reduced form model is then estimated, with a focus on the analysis of the effects of changes in the economic environment on union membership. The dependent variable is either the change in the number of union members or union density. When using the change in the number of union members as the dependent variable, lagged union density is often used as an explanatory variable, which is supposed to have a negative effect on union growth due to a 'saturation effect': if the density gets higher it is more difficult to persuade the remaining non-union members to become a union member and union growth will become less.

[3]Total union membership data are unsuitable for time-series analysis since due to the averaging over two subsequent surveys information is lost. Instead of this, data on FNV union membership are used. These data seem to be fairly representative for total union membership since both series are highly correlated. For the period 1961–89 we find (t-values)

$$\Delta\log(\text{FNV members}) = \underset{(1.1)}{-0.004} + \underset{(5.8)}{0.96}\ \Delta\log(\text{total union members}).$$

For several reasons data on the other union federations were not used. Data on the MHP union federation only exist since 1975. CNV data are less suitable for time-series analysis because the number of CNV members shows some large fluctuations, due to individual unions joining this federation.

Explanatory variables usually refer to economic conditions: prices, wages, employment and unemployment. Other explanatory variables used in empirical analysis are for example: political environment, strikes, government expenditures on social benefits.

Rising prices are supposed to induce union growth due to a 'threat effect'. Rising prices are a threat to the standards of living of workers. Rising nominal wages are usually also expected to induce union growth because of the credit workers attribute to the unions.

Employment and union membership are also positively related. If the union is as attractive to new workers as it is to incumbent workers, a growth of employment will automatically lead to a growth of union membership.

The influence of unemployment is ambiguous. Ashenfelter and Pencavel (1969) use unemployment in the preceding trough of the business cycle as an explanatory variable, because this is supposed to represent workers stock of grievances. Therefore, a positive influence is expected: the larger this unemployment variable, the more workers are inclined to become a union member. There is, however, also an argument in favour of a negative relation between unemployment and union membership. The higher unemployment the stronger the position of employers on the labour market. Therefore, workers may be less willing to risk employer retaliation by being union members. Political environment may influence union growth because some political parties are supposed to be more 'pro-union' than others. A change in the political scene may, therefore, have its effects on union growth. Strikes may induce workers to join unions in order to receive strike pay or because of public relations: strikes may favour the charisma of the unions. Finally, increasing government expenditure on social benefits may have a negative influence on union growth, if government is taking over some of the unions former tasks, thus making the unions less attractive to workers.

It is not the intention of the present study to give an extensive survey of studies on union growth. A brief survey suffices to show that there are many differences between studies, not only with respect to the kind of explanatory variables used in the analysis, but also with respect to the dependent variable. Furthermore, there are differences in the way economic variables appear to influence union growth.

Ashenfelter and Pencavel (1969) use consumer prices, unemployment and employment as explanatory variables in their seminal study on US union growth. All of these factors have a positive influence on union growth. Furthermore, they find a positive relationship between union growth and the percentage of Democrats in the House of Representatives, from which they conclude that pro-union sentiment leads to a greater demand for union representation by unorganized workers. Finally, they find a negative influence of the union density variable.

Bain and Elsheikh (1976) in their study of UK union growth find a positive influence of prices and wages, but a negative influence of unemployment. Union density has a negative influence.

A study of German union growth by Schnabel (1987) also concludes that wages and prices have a positive influence. Schnabel finds that the level of unemployment in year $t-1$ has a negative influence on union growth in year t, while unemployment in year t has a positive influence of about the same size. So, there is no long-term influence of unemployment on union membership. Finally, Schnabel finds a positive influence of the number of strikes, but no influence from lagged union density.

Carruth and Disney (1988) analysing UK union growth, find a positive influence of employment, a negative influence of unemployment and – surprisingly – a negative influence of wages. Carruth and Disney use the previous year's union density as an error correction term in their estimates. The coefficient of this error correction term appears to be significant, which seems to imply that union density is stable over long periods of time.

Recent examples of studies which use density as the dependent variable are by Booth (1983) and Neumann and Rissman (1984). Booth finds that prices and wages have a positive influence on UK union density, while actual unemployment has a negative and previous unemployment has a positive influence. In the long-run union density only depends on prices and wages.

Neumann and Rissman find a positive influence on US union density of prices, employment and unemployment. Furthermore, they find a positive influence of the fraction of representation elections won by unions and a negative influence of government expenditures on social welfare (expressed as a fraction of GNP). The latter phenomenon is ascribed as a substitution from union services to government services, which makes union membership less attractive. Neumann and Rissman also present a decomposition analysis of changes in union density from which it appears that about 45% of the decline in union density may be attributed to secular changes in the structure of employment by industry.

With respect to the influence of economic variables most studies only have one effect in common: rising prices have a positive influence on union membership. The evidence on the influence of nominal wages is mixed. Some studies do not investigate this influence, whilst most studies that do, find a positive influence with the remarkable exception of Carruth and Disney (1988). Employment appears to have a positive influence on union growth, which is not surprising. The influence of unemployment is unclear. There seems to be a difference between US and UK studies, the former finding a positive, the latter a negative influence. Perhaps, this is due to the fact that in the US short-term fluctuations in unemployment prevail, whereas in the UK, especially in the 1970s and 1980s, there was a strong increase in unemployment. If union density is used as an explanatory variable its influence is usually negative, which is consistent with the saturation hypothesis.

III. UNION MEMBERSHIP IN THE NETHERLANDS

Each country has its own characteristics in political and legal structure. Structural differences may be attributed to differences in union growth. In this section, first, a brief survey of the characteristics of the Dutch labour market, with a focus on the role of the labour unions is made (see for a survey of Dutch unions: Flanagan *et al.*, 1983, and for a survey of industrial relations in The Netherlands in the past decades: van de Wijngaert, 1990).

The main task of labour unions in The Netherlands is to negotiate on wages and non-wage working conditions, to offer special services to their members (for example, legal support) and to pay benefits when it comes to strikes. Unions have no task in paying social benefits to unemployed workers.

Employers and unions negotiate on wages in the context of important laws on collective agreements between individual or groups of employers and unions. These laws provide a legal status to collective agreements, and make it possible for the results of multi-employer negotiations also to apply to non-union members and employers not present at the bargaining table. Over the last few decades negotiations were usually on real wages. Wages are protected from price inflation by cost of living allowances based on changes in the national consumer price index. Then the bottom line in the negotiations is last years real wage. At the beginning of the 1980s the unions gave up this automatic price indexation in exchange for shorter working hours, which was thought to reduce unemployment.

There is also a strong government influence on wage negotiations. In the 1950s, there was a 'strictly guided wage policy': the government decided the wage increases of the workers. There were no actual wage negotiations between employers and unions. Since the 1960s, unions and employers have negotiated over wages but in the 1970s and the beginning of the 1980s, there were government interventions if the negotiation results were deemed harmful to the national economy. These wage controls did not occur later on in the 1980s.

Union membership does not provide a direct wage benefit for the individual. Negotiation results achieved by labour unions are also granted to non-union members. There is no closed shop except in the printing industries, where every worker is obliged to become a union member; so there is definitely a free-rider problem here.

Figure 3 shows the development of unemployment rate and the labour income ratio over the period 1961–89. In the

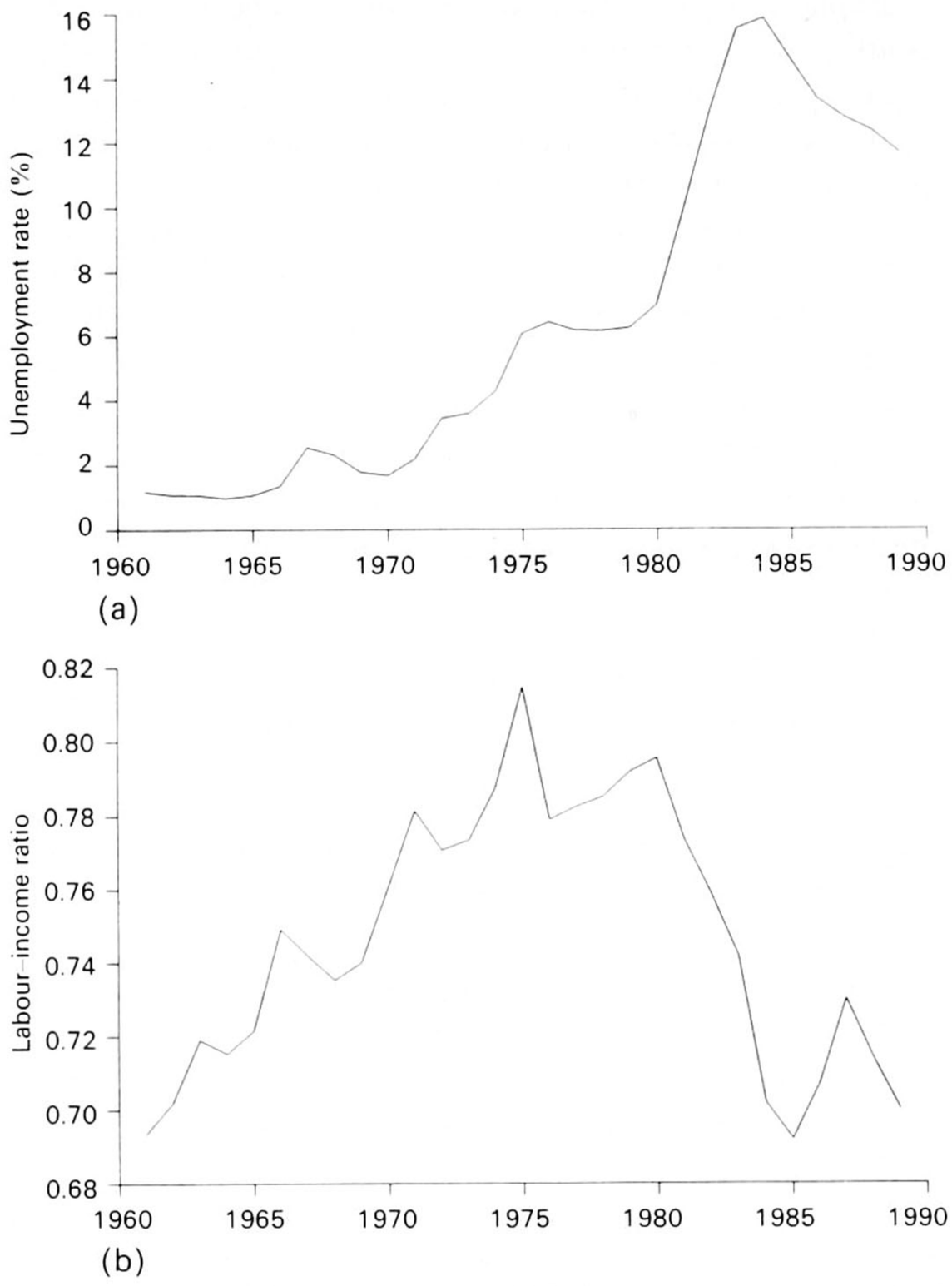

Fig. 3. (*a*) *Unemployment rate and* (*b*) *labour income ratio; 1961–89*

1960s the unemployment rate fluctuated between 1 and 2% of the labour force. In the first half of the 1970s the unemployment rate increased to 6% to remain stable in the rest of the 1970s. In the period 1980–83 the unemployment rate rose sharply to reach a maximum of 16% in 1984, since when unemployment has decreased somewhat.[4] It is obvious that the decline in union membership at the beginning of the 1980s must have had something to do with the deterioration of the Dutch labour market in that period, when unemployment grew explosively.

Another important determinant of union growth may be the negotiations result in terms of real wages. Workers will try to get a fair share of the value added in production. An indicator of this share is the labour income ratio.[5] If real wages rise as fast as labour productivity the labour income ratio remains constant. If real wages rise faster than labour

[4]The unemployment data presented in Fig. 3 are from the public employment office according to which in 1989 there were 660 000 unemployed workers. In recent years the official number of unemployed workers is estimated by panel surveys in combination with data from the public employment offices. The resulting number is thus considerably lower; in 1989 it was 390 000. The difference between both numbers for 1989 is mainly due to the fact that the registration of public employment offices lags behind actual developments in workers finding jobs.

[5]The labour income ratio is defined as the ratio of the sum of gross wages and assigned wage of the self employed to the gross added value.

productivity the labour income ratio increases, while firms' profit decreases.[6] The labour income ratio fluctuates in the 1960s and 1970s and increases from 69% in 1961 to a maximum of 81% in 1975. In the period 1980–85 the labour income ratio decreases rapidly to 70% and fluctuates in the years afterwards.

Of course, union growth is not only influenced by cyclical factors. Union growth may also be influenced by secular trends, like changes in industrial structure from highly unionized sectors to low-unionized sectors. To analyse the influence of sectoral changes in employment on union density, a so-called shift–share analysis was performed. This analysis decomposes the change in union density into three parts – the change in the sectoral structure holding union density per sector constant, the change in union density within sectors, holding sectoral structure constant and the product of both changes:

$$\Delta D = \Sigma_j D_j \Delta E_j + \Sigma_j E_j \Delta D_j + \Sigma_j \Delta D_j \Delta E_j \qquad (1)$$

in which D_j is the union density in sector j and E_j is the proportion of employees in sector j.

The shift–share analysis was performed using data on eight industries for two periods: 1973–79 and 1979–87.[7] In the first period, union density did not change much, whilst in the second period it declined rapidly. The results are shown in Table 1.

From Table 1, it appears that the contribution of sectoral changes to changes in total and FNV union density is marginal in both periods, as compared to the contribution of changes of union density within sectors. The huge decline in union density can almost entirely be attributed to the latter factor. From this it is concluded that the influence of sectoral changes on union density is negligible. So, there appears to be no secular negative trend influence from changes in industrial structure. This conclusion is surprising, given that other studies have stressed the importance of changes in industrial structure. As stated before Neumann and Rissman found that these changes explained almost half of the changes in union density. Visser (1987) found that about one-third of the decline in union density in The Netherlands in the period 1979–85 may be attributed to changes in industrial structure.

Starting in 1973, the two-yearly CBS survey on union membership also provides information on the inflows in and outflows from unions. Table 2 gives an overview of this information. From this table it appears that three periods may be distinguished. First, in the 1970s there is a small net growth of the number of union members, because the inflow is larger than the outflow. Second, in the first half of the 1980s there is a substantial decline in union membership, which is especially due to a decrease in the inflow. Third, by the end of the 1980s there is a rapid growth of union membership because the inflow increased and the outflow decreased. The recession at the beginning of the 1980s did not lead to union members giving up membership but led to a decrease in the flow of new union members. Apparently, union membership became less attractive to workers who were not yet union members. A possible reason for this is the rise in unemployment, which unions obviously were not able to prevent. Also real wages hardly increased or even decreased, which was another sign of weakness: the declining

Table 1. *Decomposition of changes in union density* (%)[a]

	Total		FNV	
	73–79	79–87	73–79	79–87
Sectoral structure ($D\Delta E$)	−0.8	−0.3	−1.6	−1.4
Sectoral density ($E\Delta D$)	1.8	−9.8	−1.8	−7.2
Interaction ($\Delta D\Delta E$)	−0.0	−0.1	0.1	0.5
Total (ΔD)	1.0	−10.2	−3.3	−8.1

[a]Data are from March of every year.

[6]The relationship between labour income ratio, real wages and labour productivity holds exactly only if producer prices are used to calculate real wages.

[7]The membership data used in the shift–share analysis are exclusive of unemployed and retired workers. The following eight industries are distinguished (1987 total union density in per cent):

1. Agriculture and fishing (33)
2. Manufacturing (30)
3. Construction and installation (47)
4. Trade, hotel and catering, repairs (11)
5. Transport, storage and communication (38)
6. Banking and insurance (8)
7. Education (50)
8. Other sectors (40).

labour income ratio underlines the weak position of the unions. In the second half of the 1980s unions regained some of their former charisma: employment was rapidly growing, unemployment decreasing and real wages increasing again. Yet, the growth in union membership was insufficient to raise union density.

IV. AN EMPIRICAL ANALYSIS: 1961–1989

From the discussion in Section III on the institutional structure of the Dutch labour market it is obvious that not all explanatory variables used in other studies on union growth are equally suitable for an analysis of union growth in The Netherlands. Government expenditure on social benefits, for example, is an irrelevant variable since the unions never had that task in the period of analysis. Political variables do not seem to be important either. Since World War II Christian Democrats have been in power, sometimes in coalition with the Socialists and sometimes with the Conservative-Liberal party. Drastic changes in the political environment have therefore never occurred, so one does not expect an influence from politics on union growth. Finally, prices will not influence union growth much, because from the end of the 1960s until the beginning of the 1980s there was a price indexation of the wages. Negotiations are, for a large part of the period of analysis, on real wages. Workers will also be interested in the rise in real wage compared to the rise in firms' profits, so they will be interested in the development of labour income ratio.

Developments in the period 1961–89 were analysed. The 1950s were omitted from the analysis, because in this period there were no actual wage negotiations between employers and unions. Wages as well as prices in this period were to a large extent determined by government policy.

In the analysis we used the traditional approach with the change in the number of (FNV) union members as the dependent variable and lagged union density as one of the explanatory variables. Both long-term relationships and short-run dynamics are of interest here. To investigate long-run relationships co-integration analysis is used. According to this analysis many economic time series that tend to trend up or down over time in a non-stationary fashion may still drift together. If the difference between these series is stationary then we may regard these series as defining a long-run equilibrium relationship. The technical details of the co-integration analysis are given in the Appendix. The main conclusion from this analysis is that there is a long-term relationship between union density, unemployment rate and labour income ratio, specified as:

$$\log D = -7.7 - 0.072 \log U + 1.41 \log A \qquad (2)$$

in which D is the (FNV) union density, U is the unemployment rate and A is the labour income ratio.

From this equation we may derive that with a stable unemployment rate of 10% and a stable labour income ratio of 70, FNV union density will eventually stabilize at about 21%. With an unemployment rate of 5% and a labour income ratio of 75 this would be about 25%.

Since Equation 2 is a long-term relationship we may use the residuals z of this co-integration regression as an explanatory variable in a first-difference regression. The estimation results of this regression are shown in Table 3. The dependent variable used is the change in union membership,

Table 2. *Inflow to and outflow from labour unions (percentage/year of total union members at the beginning of that year)*

	Inflow	Outflow	Net growth
1972/3	12.4	11.0	1.4
1974/5	11.9	10.7	1.2
1976/7	11.4	10.0	1.4
1978/9	10.2	9.7	0.6
1980/1	8.3	11.1	−2.8
1982/3	7.3	10.0	−2.7
1984/5	6.1	8.8	−2.8
1986/7	8.3	7.7	0.5
1988/9	10.9	7.2	3.7

Source: CBS Union survey, held in March every two years.

Table 3. *Estimation results; 1962–89*[a]

Dependent variable: $\Delta \log M$ (rate of growth of FNV union membership)

$\Delta \log U$	$\Delta \log A$	$\log D_{-1}$	$\log U_{-1}$	$\log A_{-1}$	$z(-1)$[b]	$\bar{R}^2$	DW
−0.033	0.58	—	—	—	0.32	0.484	1.82
(1.8)	(4.0)				(3.6)		
−0.039	0.52	−0.32	−0.027	0.48	—	0.456	1.92
(1.7)	(3.0)	(3.5)	(3.4)	(2.8)			

[a] t-values in parentheses; R^2 corrected for degrees of freedom, DW = Durbin–Watson statistic; to save space the values of the constant are not presented in this table.
[b] $z = 7.7 + \log D + 0.072 \log U - 1.41 \log A$.

explanatory variables are the change in unemployment rate, the change in labour income ratio and the lagged residuals of the co-integration equation. The estimation results show that both the change in labour income ratio and the lagged residuals from the co-integration variables are significant at a 5% level. The change in unemployment rate is significant at a 10% level. In the second estimate lagged union density, lagged unemployment rate and lagged labour income ratio were directly specified as explanatory variables. The results of both estimates do not differ very much.

For both equations the Chow test for parameter constancy was also performed, splitting up the sample in two periods (1962–79 and 1980–89). This test indicates that there has been no structural break in either equation when union membership started to decline rapidly.

V. CONCLUSIONS

Union membership in The Netherlands grew in the 1960s and 1970s and kept up with the growth of employment. This led to a rather stable union density. At, the beginning of the 1980s union membership showed a remarkable decline while only in recent years has there been some recovery.

A shift–share analysis on union densities to disentangle the effect of a changing industrial structure from the effect of changes in union densities within sectors was performed. It appears that the effect of changes in the industrial structure is very small. There seems to be no structural decline of union density in The Netherlands. From this point of view the decline in union membership is temporary and the bargaining position of Dutch labour unions in wage negotiations does not seem to be weakened.

From time-series analysis of union growth of the largest union federation, FNV, it appears that union growth may be attributed to wage growth and unemployment. If real wages increase more than labour productivity (labour income ratio rises) or if unemployment rate declines, union membership increases.

Using the estimation results it is concluded that the rapid decline of union density at the beginning of the 1980s is not related to changes in the industrial structure but to the decline in the labour income ratio and the growth of the unemployment rate.

The strategy of the Dutch labour unions in the 1980s was to moderate demands in wage negotiations in order to reduce unemployment. With respect to union membership, it is not obvious that this policy was right or wrong. Low-wage demands have had a negative influence on union membership. But, higher-wage demands might have increased unemployment to the extent where the effect on union membership would have been even worse.

APPENDIX: UNIT ROOTS AND CO-INTEGRATION ANALYSIS

A stationary series has a constant mean and a constant finite variance. A non-stationary series has a time-varying mean and variance. Variables which are evolving over time often have time series which are non-stationary. Stationarity of these time series may be obtained by first differencing once, in which case the original series is called integrated of order one. According to co-integration theory, a linear combination of variables integrated of order one may be stationary (Engle and Granger, 1987). In that case, these variables are co-integrated: the error term of a co-integration regression will not drift from zero and may be used as an explanatory variable in a first-difference regression.

So, if union density is integrated of order one, one has to find a co-integration relation between union density and other variables, and use the residuals of this stationary combination as an 'explanatory variable' in a first-difference regression.

A necessary condition for the time series to be co-integrated is that each series is integrated of the same order. The hypothesis that a time series is integrated of order one, can be determined by testing whether that series has a unit root. For this the (augmented) Dickey–Fuller tests are used, applied to the series of

M = (FNV) union members,
D = union density,
U = unemployment rate,
L = employment,
P = consumer prices,
W = nominal wage,
S = strikes,
A = labour income ratio.

The augmented Dickey–Fuller values are estimated in regressions without a constant term, in regressions with a constant term and in regressions with both a constant term and a time trend. The results are shown in Table A1.

Comparing ADF values from the different regressions it is obvious that only a few differ significantly negative from zero. For the series of strikes the ADF value of the regressions with a constant and with both a constant and a time trend differ significantly from zero. In a regression without a constant the ADF value does not differ significantly from zero. Given the development of the number of strikes in The Netherlands, which has definitely no positive or negative trend, the latter ADF value is preferred. Therefore, it is concluded that none of the ADF values differs significantly (negative) from zero at a 5% level; so the null hypothesis of a unit root cannot be rejected.

For the first differences of the variables we used Dickey–Fuller tests, from which it appears that first differences clearly do not have a unit root, except for nominal

wages and employment, which are probably integrated of order two.

For the co-integration regression use is made of union density in combination with other variables which have a unit root: unemployment rate, labour income ratio and strikes. Prices could also be used, but without including nominal wages this does not seem very useful.

Since there is no long-time series, simple co-integration tests are used. The augmented Dickey–Fuller values are calculated to test the null hypothesis that the variables are not co-integrated. From Table A2 it appears that if a combination of union density with either unemployment rate or labour income ratio is used, the null hypothesis cannot be rejected. However, if use is made of union density in combination with both unemployment rate and labour income ratio, the null hypothesis can be rejected. Adding strikes to this combination has no use. Therefore, we conclude that union density, unemployment rate and the labour income ratio are co-integrated.

Table A1. *Testing for unit roots; yearly data 1961–89*[a]

	ADF	ADF_c	ADF_t
$\log M$	0.28	−1.66	−1.57
$\log D$	1.54	0.19	−0.81
$\log U$	−1.55	−1.14	−3.23
$\log L$	2.12	0.70	−1.30
$\log P$	2.45	−0.85	−0.79
$\log W$	0.35	−2.04	0.12
$\log S$	−0.88	−3.71*	−4.12*
$\log A$	0.32	−2.20	−1.64
	DF	DF_c	
$\Delta\log M$	−3.88*	−3.83*	
$\Delta\log D$	−3.82*	−4.20*	
$\Delta\log U$	−3.45*	−3.69*	
$\Delta\log L$	−1.59	−2.69	
$\Delta\log P$	−2.09*	−3.57*	
$\Delta\log W$	−1.24	−1.67	
$\Delta\log S$	−7.32*	−7.21*	
$\Delta\log A$	−4.70*	−4.64*	

[a]ADF_c estimation with constant; ADF_t estimation with constant and time trend.
*differs significantly negative from zero at 5% level; critical 5% values: (A)DF: −1.95, (A)DF_c: −3.00, ADF_t: −3.60.

Table A2. *Co-integration regressions: 1961–89*

Dependent variable: $\log D$					
Constant	$\log U$	$\log A$	$\log S$	$\bar{R}^2$	ADF
−1.65	−0.067	—	—	0.378	−1.01
−7.02	—	1.29	—	0.345	−1.41
−7.73	−0.072	1.41	—	0.872	−3.86
−7.65	−0.076	1.40	−0.013	0.823	−3.24

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